

ACCIDENTS AND INJURIES OF THE
EYES- THEIR PREVENTION AND
TREATMENT
F. Park Lewis

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ures are a gain of one to two pounds in weight per week. A gradual improvement in the bowel movements, a feeling of improvement, better rest nights, and a gain in strength, in proportion, and in from two to three weeks a marked change for the better will occur in the ptosis, and a decided increase in the strength of the abdominal muscles.

It is not only safe to make such a prediction, but it is a wise thing to tell the patient what may be expected, as it helps to secure co-operation.

Then, too, when these prophesies begin to be fulfilled, your patient's hope and courage and determination grow apace.

I will only lengthen this paper sufficiently to refer to two or three cases which are fair illustrations of what can be done for these chronic sufferers.

Mrs. W. D. N., thirty-two years old, a chronic invalid for thirteen years, mother of one child ten years old. Came to my office November 30, 1900. She suffered from weakness, headache, constipation, scanty and painful menstruation, tachycardia or palpitation, and worst of all a feeling of apprehension of sudden death, which so controlled her that she dared not stay alone in the house much less go out alone.

Examination showed her stomach to reach a point a hand width below the navel, right kidney palpable just above the pelvic brim, colon festooned and uterus displaced downward and backward.

She was treated according to the plan already described, with the result that her symptoms disappeared, and on March 2, 1901, my diagram showed her stomach and kidney about in their normal position. On December 15, 1911, she came to see me again for neuritis in her arm, and I requested an examination of her abdominal organs for comparison with the earlier diagram. This showed her organs in normal position as when she left my care in 1901, and she said she had had no symptoms referable to her old trouble since she left my care.

This case was reported more fully in a paper read in 1911 at the New York State Medical Society, entitled, "After ten years: a record of experiences with abdominal ptosis."

Another case in which the diagnosis of the stomach position was confirmed by observation on the operating table may be reported.

Mrs. C. D. S. came under my care March 30, 1903. I will not go into the details of all her symptoms, which were much like I have described as a typical case, but my examination showed her stomach as low as the brim of the pelvis, and a prolapsed uterus badly lacerated from child birth (she had two children), and on the advice of a surgeon she went into the Women's and Children's Hospital, October 6, 1903, and was operated for repair of the cervix and ventral suspension of the uterus.

At this operation her stomach presented in

the wound and it was difficult even in the Trendelenburg position to keep it back enough to have the field free for the suspension operation.

The operation was a success from the surgical standpoint, as the patient recovered. A rather protracted course of treatment was required to get the patient in good condition.

Another operation for hysterectomy in 1908 showed a practically normal position of the stomach, and with ups and downs due to a very strenuous life, she had been and is pretty well as compared to what she was for years previous to 1903.

Another case briefly reported will be sufficient to illustrate what I have said in this paper.

Case 3.—Mrs. C. C. D. Consulted me November 25, 1908. She was married, mother of one child eleven years of age, of good heredity. She dates her illness to a nervous breakdown ten years ago from which she had never recovered. She complained of gas, palpitation so that she frequently had to sit up at night for a while. Of headaches, constipation, numbness in limbs and arms, weakness, etc.

Examination showed the lower border of the stomach about two inches below the navel, the right kidney displaced downward about four inches, and the other evidences of general ptosis of the abdominal contents, and weight one hundred and three pounds.

The treatment combined the regime described, and on February 1, 1909, my diagram showed great improvement in all the conditions, including the position of the stomach, weight 109½ pounds. The following September 23d she showed weight 120¾ pounds and the stomach about in normal position.

I have known the patient and cared for her when she needed medical attention since that time, and to the present have only been asked to prescribe for occasional or transitory conditions.

The prescribing of such a regime may seem easy, but its success depends on experience and the courage and conviction to secure the co-operation of the patient, and the physician must see the patient frequently enough to keep up his co-operation and courage until he can see results. Then things will move on more smoothly and less personal attention will be required.

ACCIDENTS AND INJURIES OF THE EYES—THEIR PREVENTION AND TREATMENT.*

By F. PARK LEWIS, M.D., F.A.C.S.,
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I WAS impressed some time since with the disproportionately large number of serious accidents and injuries of the eyes which I found coming under my observation. I asked my secretary, therefore, to go over my records

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for the past year, noting all cases of this nature which had been of a serious character, with the conditions under which the accidents occurred, and to note whether under other circumstances they might have been prevented. I found that, excluding trifling cases, such as, foreign bodies in the cornea, superficial scratches, etc., the following cases had come under my observation.

It will be evident that these were in large measure the result of gross negligence and carelessness. So many serious disasters, with a life long of wretchedness and limitation of opportunity following, led me to the preparation of this paper, in the hope that a wider knowledge of the prevalence of such conditions might lead to more effective measures for their prevention.

SERIOUS EYE CASES OBSERVED DURING 1914 AND 1915.

<i>Name, Occupation and Age</i>	<i>Place and Date</i>	<i>Injury and Cause</i>	<i>Remarks</i>
G. R.—46 yrs. —Glazier.	Buffalo, N. Y. Sept. 12, 1914.	Eye cut by shattered glass while breaking pane. Cut extending through the cornea, iris and lens, causing cataract.	Eye ball saved, sight lost.
A. C.—12 yrs. —School.	Niagara Falls, N. Y. Nov. 5, 1914.	Struck in eye by work bag thrown by another child. Dislocation of lens with cataract, and partial rupture of the sclera.	Eye ball saved, light perception.
Dr. E. H. W.—56 yrs.—Retired Physician.	St. Catharines, Ont. Nov. 10, 1914.	Struck in right eye by flying splinter while chopping wood. Paralysis of accommodation, concussion of retina. Sight reduced to 2/200. Subsequently improved to 2/100.	Eye retained, but sight practically lost.
R. W. W.—34 yrs. —Machinist.	Silver Creek, N.Y. Oct. 14, 1914.	Piece of steel flew in eye while turning lathe. Case seen in consultation. Steel had been removed, leaving opacity of lens and adhesion of pupillary margin.	Vision reduced to one-half. Would not be useful vision if it were only eye remaining.
R. T.—40 yrs. —Stone cutter.	Buffalo, N. Y. May 18, 1914.	Struck in right eye by chip from stone while working. Right lens cataractous. Radiogram shows stone still in eye. Eye quiet. No useful vision.	Eye still dangerous to safety of left.
M. C.—4 yrs.	Welland, Ont. Dec. 1, 1914.	Cut in eye while playing with a sharp penknife; cataract resulting, which was treated in Hamilton. Eye became glaucomatous. Large ireectomy.	Eye ball saved. Sight had already been destroyed.
J. T.—38 yrs. —Laborer.	St. Catharines, Ont., Can. Sept., 1912. Date of Consultation, 2/27/15.	While working at a drill, struck in eye by piece of steel. Degeneration of the tissues of eye ball. F. B. still in eye. Light perception.	Removal of eye advised.
F. T.—36 yrs. —Teamster.	Niagara Falls, N. Y. May 2, 1915.	Struck in eye by piece of glass. Leucoma. Adherens with partial cataract. Plastic bands extending from cornea including iris and lens.	No light perception.
W. T.—39 yrs. —Stone cutter.	Rochester, N. Y. July 5, 1915.	Piece of steel in eye since 1901. Luetic history. Eye now suffering from result of blow. Imperfect light perception.	Eye should be removed.
O. S.—63 yrs.—General man in factory	Portville, N. Y. April 17, 1915.	Struck in eye by large piece of steel while cutting bolt with a cold chisel. Was treated for the injury.	Eye ball saved. Sight lost.
A. L.—28 yrs. —Farmer.	Collins Centre, N. Y. June 25, 1915.	Cornea badly burned by premature explosion of a cartridge which he endeavored to jam in his gun. Wound healed, leaving scar with defective vision.	
J. K.—4 yrs.	Perrysburg, N. Y. Jan. 4, 1915.	While cutting string knife slipped, cutting cornea, involving lens.	Recovery, with absorption of lens and imperfect sight.
C. I.—48 yrs. —Labor helper.	Lockport, N. Y. March 1, 1915.	Struck in eye by piece of coal which he was breaking with his hammer. Extensive ulceration of the cornea following which was successfully treated by Dr. Ringueberg by transplantation of conjunctiva.	Eye ball saved, but without useful vision.
Wm. H.—24 yrs. —N. Y. C. R. R.	Buffalo, N. Y. July, 21, 1915.	Was looking up while man above was chipping a spike. Piece came suddenly off and fell six or seven feet striking eye.	Recovered with good sight.

<i>Name, Occupation and Age</i>	<i>Place and Date</i>	<i>Injury and Cause</i>	<i>Remarks</i>
L. H.—28 yrs. —Assistant Boiler Maker.	N. Y. C. R. R. Feb. 27, 1915. Buffalo.	While welding two pieces of hot iron together, hot iron flew in eye, burning the cornea. Burn was superficial.	Patient recovered without loss of sight.
S. N.—36 yrs. —Carpenter.	N. Y. C. R. R. Jan. 25, 1915. Buffalo.	While hammering iron, piece flew in the eye causing contusion of eye ball.	Recovered with good sight.
T. N.—43 yrs. —Laborer.	N. Y. C. R. R. May 31, 1915, Depew, N. Y.	Foreign body in eye. Removed by local surgeon. Neglected by patient. Ulcer developing, leaving corneal scar.	Slight defect in vision.
W. O.—43 yrs. —Locomotive Plumber.	Corning, N. Y. Jan., 1914.	While working under table plate, hammering, speck flew in eye. Has been gradually losing sight in both eyes since. Detachment of the retina, with floating opacities in the vitreous. Practical loss of sight.	Injury had nothing to do with the loss of sight.
B. J. O. L.—26 yrs. —Electrician.	Buffalo, N. Y. Nov., 1914.	Had foreign body taken out by fellow workman. Infection followed. Was under care of a number of doctors. Ulcer healed, leaving small scar.	Probably constitutional.
G. J. G.—21 yrs. —Salesman.	Buffalo, N. Y. April 6, 1915.	Struck in eye by suit case which fell from shelf. Considerable contusion.	Recovered without loss of sight.
B. P.—39 yrs. —Farmer.	Irving, N. Y. July 31, 1915.	Struck in eye when a boy by a whip lash. Had been operated for resultant cataract. Glaucoma.	No useful vision.
J. P.—48 yrs. —Foundryman.	Niagara Falls, N. Y. Sept. 4, 1914.	Burned from aluminum. Adhesion of the lids to the eye ball. Available portion of the cornea covered.	No useful vision.
A. B. F.—36 yrs. —Machinist.	Welland, Ont. March, 1915.	Rupture of the sclera from foreign body striking the eye. Iridectomy.	Half vision preserved.
M. S.—8 yrs. —School.	Warsaw, N. Y. April 5, 1915.	Struck in eye by a b.b. shot from an air gun. Cataract absorption.	
M. E. D.—24 yrs. —Machinist.	Belmont, N. Y. Nov., 1913. Date of Consultation 7/28/14.	Foreign body in eye for six months which was undiscovered. Located by radiogram. Removed with preservation of eye ball.	No useful vision.
F. D.—40 yrs. —N. Y. C. R. R.	Buffalo, N. Y. July 20, 1915.	Foreign body in eye. Removed by local physician. Self treated, leaving corneal scar. Permanent defect in vision.	
J. D.—21 yrs. —Laborer.	Niagara Falls, N. Y. July 4, 1915.	The explosion in eye of giant firecracker. Syntitis cataract. Iridectomy.	No useful vision.
C. L.—12 yrs. —School.	Buffalo, N. Y. June 29, 1915.	Consultation with Dr. L. M. Francis. Struck with dead eye attached to rope when accidentally swung by playmate. Rupture of sclera, prolapse of iris.	Subsequent enucleation.
J. M. L.—42 yrs. —Laborer.	Buffalo, N. Y. Standard Oil Co. Aug. 2, 1915.	Burned in face by breaking of glass tank, containing hot sulphuric acid. Burn of the first degree covered entire face. Burn of lids and epithelium of cornea.	Eye saved by goggles which he was wearing. No loss of vision.
J. E.—10 yrs. —School.	Hornell, N. Y. Oct. 6, 1914.	Blow from stone held in boy's hand severely injured the sclera. Treated by oculist in an endeavor to save eye ball. Two weeks later sympathetic inflammation developed in the fellow eye. The hurt eye was promptly enucleated, but inflammation continued. Vision now reduced to 20/200.	Boy is entering School for the Blind at Batavia.
C. W. M.—37 yrs. —Plumber.	Buffalo, N. Y. Sept., 1915. Consultation.	While trying to find a leak in a copper lavatory ball by holding it over the flame his attention was diverted, and the ball, in which there was some water, exploded, rupturing eye.	Loss of sight. Possible enucleation later.
F. S.—60 yrs. —Carpenter.	Corfu, N. Y. Sept. 20, 1915. Consultation, Dr. E. C. Smith.	Fell from ladder striking back of head. Had saw in hand, and the handle probably struck the eye. Ball was ruptured. Wound about 3/4-in. long.	Immediate enucleation.

The reason for the physician and surgeon in civilized life is that he might correct the blunders and repair the wrecks of humanity. In the general stock taking of efficiency methods, to the necessity of which the civilized world seems to be slowly awakening, it has become evident that the human machine has a large potential as well as an actual value. Men and women when they have no longer any workable possibilities can not be thrown in the scrap heap unless their value is completely destroyed, in which case their productive power for others is also lost. They become burdens, which must be carried, impeding the progress of others—thereby lowering the effectiveness of the group to which they belong, and that of the activities of life everywhere.

This intimate relationship and interdependence of all men upon each other has found expression in the readiness on the part of the state to assume the responsibility for the loss of life, or of the effectiveness of an individual, when this occurs in the performance of his daily avocations. The state in allowing a compensation award recognizes the fact that if life remains, even this remnant of a man must be fed and clothed, or if he is killed that those who have been dependent on his labor must still be supported, for it is not exacted that even reasonable precautions be taken for his own safety or protection. But as Carlyle caustically remarked many years ago: "There are so and so many millions of people in America, mostly fools!" It becomes imperatively necessary, especially in the case of people whose work requires little thought, and in the case of children, and especially in the case of everybody else that safeguards be thrown about them in the employment of such hazardous employment as experience has shown to result in injury to themselves or to others.

In the ordinary routine of daily life an occasional accident makes little impression even upon those with whom the victim has been closely associated. Our responses are singularly dull and slow. The average man or woman is shocked on witnessing an accident, but ordinarily he draws no conclusions from it which would be of service in preventing the repetition of a like tragedy. In the back of his mind he looks upon this as a unique occurrence. It never happened to him or to any of his friends before, and in all probability it never will again. He thereby puts it out of his mind, and draws no helpful conclusions from it which might serve as a protection in the future. It is, however, by the aggregation of many such individual happenings that a series of disasters of appalling magnitude are ultimately accumulated. We find that in the ordinary routine of life had protective meas-

ures been generously employed and reasonable care exercised, their cost would have been infinitely small in comparison with the saving of life and limb—to say nothing of the money compensation which they would represent.

It seems to be worth while, therefore, for us to determine the existing facts concerning the accidents and injuries seriously affecting sight, because it is difficult to conceive of any more deplorable misfortune that can come to a human being than that of blindness—none which more completely shuts him out from the activities of life—or which is more inevitably followed by a condition of wretchedness and misery. When sight is lost in adult life or middle age it is with the greatest difficulty that social and economic adjustments are re-established. It, therefore, in any large number of cases, it can be shown that by the adoption of reasonable precaution, or of measures by which such calamities might be averted, even aside from the humanitarian question involved, it becomes an obligation, resting upon all of us who can in any degree help to do what we can to protect those who, from ignorance or lack of opportunity, are unable to care for themselves.

It is undoubtedly the common belief, even of surgeons, that a large proportion of the accidents to the eyes are unavoidable.

In order to get a few basic facts, and without any intention of thoroughly canvassing the subject, I wrote to the Medical Adviser of the New York State Compensation Commission, asking him how many cases of loss of sight had been presented to the commission since its origin, and what proportion of them might, in his judgment, have been prevented by the use of suitable protective devices and the exercise of reasonable care. In a letter received from Dr. Loughran, dated September 7th, he says:

"In the State Fund we have had about fifteen cases where sight has been lost in one or both eyes, and as we insure about 10 per cent of all the employers in the state, I should think that it was safe to say that the total number of cases would be about 150; and of these 150 cases, I would estimate that 50 per cent could have been avoided had the applicants worn goggles; that is, half of them, on account of their occupations, should have worn goggles."

He also goes on to say: "That the State Fund, through its Safety Inspectors, is insisting that employers furnish goggles to men who are engaged in hazardous occupations—grinders, stone cutters, etc." Acetylene welders are advised to use properly tinted glasses. "Personally, as soon as an eye accident is reported, I at once write to the employer, showing the necessity for the use of goggles, and pointing out that unless he furnishes, free to the

employees, properly ground and fitted goggles, and instructs them in the necessity of their use, he is morally responsible for any injury that may occur. I have had the heartiest co-operation of all of the employers, and I believe that many of the men are now protected, who were not so a few months ago."

I also wrote to about twenty-five of my personal friends, who are engaged in ophthalmic practice, asking them the following questions:

1. How many cases have you seen during the past year, up to the present date, in which sight has been lowered by accidents or injuries which might in any way have been prevented?

2. How many in which sight was lost in one eye—in both?

3. Will you describe briefly the character of the various accidents and by what means they might have been avoided, or better results as to sight obtained?

4. Were protective devices generally used as far as you know in factories and about machinery in those accidents to the eyes which have come under your notice?

5. Have you any suggestions as to immediate care on the part of the general physician whom the injured first consult?

Let me quote a few of the opinions which have come from well-known eye surgeons:

Dr. Decot, of Buffalo, who sees a large number of eye accidents, says: "Better results would have been obtained, first, had the physician not tried to do so much for the case and sent it to a specialist sooner; second, had the patient been instructed as to the dangers of infection." and then he adds, "That the general practitioner has not had the experience, nor has he the instruments for careful eye work. He should, therefore, refrain from poking at the case until the wound is three or four times the original lesion. Many minor cases have come to me after such treatment, and it is only by the best of care that the cases did not turn out major ones. It is very noticeable even in the removal of foreign bodies from the cornea, often the cornea is injured extremely, and infection or ulceration results, whereas if done properly the man would loose but a few hours work."

Dr. John D. Flagg, of Buffalo, reports fourteen cases which he has seen during the past year. Of these fourteen cases of avoidable accidents sight was partially lost in eight and totally lost in six. Among the causes cited in these cases was in one the accidental use of a 22 per cent solution of nitrate of silver as a prophylactic against ophthalmia neonatorum. It resulted in corneal scar with practical blindness. Two traumatic purulent ulcers, undoubtedly pneumococcic infection. Healed with corneal scar, material loss of sight. One a Fourth of July explosion. One case of a piece of steel in the lens. In

one a foreign body which left a cloud with diminished vision. One a thorn penetrated the eye destroying the sight completely. Dr. Flagg suggests, that when the attending physician sees that the case is a serious one he should at once send the patient to a specialist. He should be careful to use antiseptics for his hands and instruments, and that his instruments should be sharp.

Dr. Kirkendall, of Ithaca, on the same subject, says: "The greatest point in the question of eye injuries is their immediate and proper treatment. A 1½ per cent solution of atropine mixed with castor oil, which never deteriorates, should be at hand. It is always ready for use and can be dropped in the eye with a clean match or a sterilized toothpick. It dilates the pupil and is an antiseptic."

"I believe," he adds, "that 10 per cent of the eyes that are lost come to an oculist too late for relief."

Dr. Case, of Elmira, goes still further. He says, "My experience is that as a rule the general practitioner can do but little. He makes very bungling work even at removing foreign bodies. I think if he would merely alleviate suffering by cocaine, and, if necessary, an opiate, and put on an aseptic bandage, he will have done his duty."

In the case of eight severe eye accidents, in three of which an eye was lost, Dr. J. R. Sackrider, of Jamestown, found that all of these cases had in their work been hit by flying particles, which had abraded the cornea, and the abraded surface had become infected. In all of these cases from six days to two weeks had elapsed between the time of the injury and going to the physician for medical attention. In three cases pus was in the anterior chamber in quantity before they were seen by a physician. *In the above cases, the fault, he says, was entirely with the individual as they did not seek aid until it was too late.*

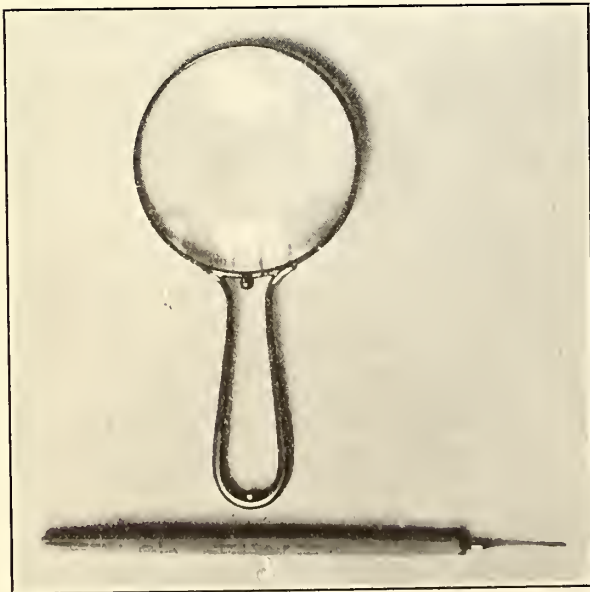
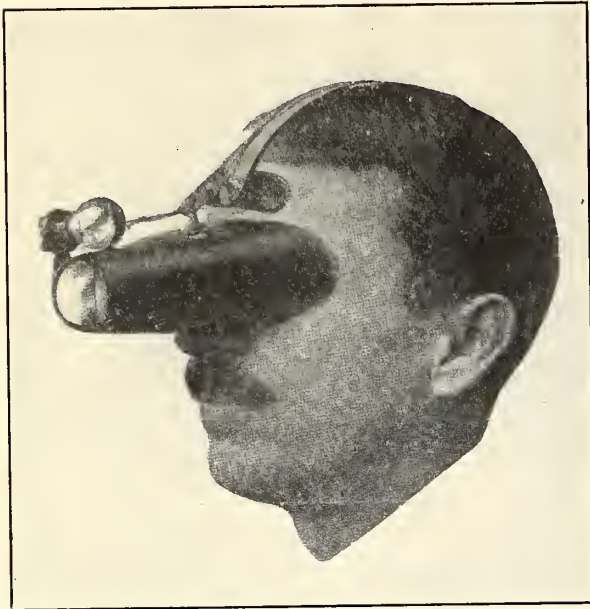
Dr. Bissell, of Rochester, thinks that since the Compensation Act became effective the men receive much more prompt and better attention.

Dr. B. H. Grove, of Buffalo, says that the immediate care of an injured eye should consist of thorough cleansing, the use of cocaine and atropine, an antiseptic bandage, and a speedy reference to some one who understands the care of the eye. The experiences and recommendations of others were along singularly similar lines.

I do not myself believe that it is not fully within the power of any surgeon to remove a foreign body from the eye completely and skillfully, and without undue damage to the tissues. It is essential only that he shall possess the simple appliances which are necessary, and a firm and gentle hand.

These consist of a lens by which the light

should be thrown obliquely through the cornea, thereby making any foreign body stand clearly in view; a spud, which should be made surgically clean before it is used, and a loup or binocular lens which is held before the eyes in a frame, and which gives amplification of four or five diameters. It is possible with this to see the smallest particle of foreign matter in the eye, and to remove it in its entirety.



(1) A Magnifying Loupe to see the foreign body clearly, (2) A Double Convex Lens to focus the light obliquely on the cornea, (3) and a Spud, which has been sterilized by quickly passing it through a flame, should enable any physician with a steady hand to remove a foreign body without undue injury to the eye.

If there is any doubt in the mind of the surgeon as to his ability to do this he should immediately place his patient under the care of some one who can. It is unwise for any one unaccustomed to treat injuries of the eyes to attempt to operate upon an accident of a major character.

I also made inquiries of a large number of employers of labor, asking them the following questions:

Are protective devices used on your machinery where practicable, and if so, of what nature?

Is any effort made to secure the use of goggles in work in which the eyes are in danger from flying particles from emery wheel or elsewhere?

Are the men allowed to give first aid to an injured eye, or is skilled service insisted upon?

Are prompt reports of eye injuries, even when of a minor character, made at the office, and are the results followed up and recorded?

Are eye accidents frequent? Can you give any suggestions as to measures for their prevention?

Where protective devices and goggles have been used, have you found a material lessening in the number of eye injuries?

Is the work of the employee so adequately lighted that accidents are not liable to occur?

Is protection employed where molten metal or corrosive chemicals are used in preventing them splashing in the face and eyes?

In a letter received from the Efficiency Engineer, Mr. J. P. Jordan, of the Gould Coupler Works, he says: "The use of goggles decreased the number of eye injuries to a very wonderful extent. The writer had a comparison made about two years ago before he left this company, and his recollection is that it showed a decrease of nearly 75 per cent in reported eye accidents."

One of the most effectively managed large plants which has come under my observation is that of the Pierce-Arrow Motor Car Co., Mr. Thomas, Assistant General Manager and General Factory Superintendent, writes concerning the measures used in this company. He says: "We used to have a good many cases of ulceration of the cornea due to emery-wheel chips entering the eyes of the workmen who were grinding tools on emery wheels, but we make it absolutely compulsory for such men to wear goggles, and there has been a marked decrease in the number of accidents. Whenever any operation is in progress which might be injurious to the eyes, we do everything in our power to induce the men to wear goggles; and all through the factory we use screens wherever necessary to prevent chips flying in the face of the workman. With regard to first aid, we absolutely prohibit any workman giving aid to eye or other injuries, and the

injured man is made to go at once to our First Aid Department, where we have a resident medical man and two assistants, who are entirely capable of taking care of any injuries, minor or otherwise."

From a limited number of inquiries of this kind it has become evident that protective measures are being employed in most of the large plants. The men are advised as to how they should be used, and personal efforts are employed in preventing the men from suffering from injuries.

In smaller plants, however, this is not true. They have not yet realized that the expenditure of a small amount of money and a slight amount of time in seeing that the plant is well equipped with protective devices, and the men advised as to their use, is good business. It lowers the rate of their insurance and makes for better workmanship.

Accidents from molten metal splashing in the face and eyes, are frequently due to the path along which the molten metal must be carried being too narrow. The law requires that these pathways have a width of at least eighteen inches. In many factories they are much less. Men are obliged often to carry molten metal to the weight of two hundred feet through these narrow ways. It must also be carried in great haste, as the metal so quickly cools. Hence it happens that men stumble and the metal is splashed upon them. Inspectors are indifferent in enforcing the law, and hence the frequency of accidents which result in damage to life and limb, and when the face is involved, to the loss of sight.

Another of the common accidents is due to putting the hot metal into moulds in which some water has gathered. The sudden development of vapor causes an explosion, and the burning fluid is splashed in the face of those who are within reach.

Another common cause of accidents is the sudden condensation of the atmosphere in the foundry causing a thick blinding vapor. This, I am told, is due to opening the doors and windows and letting the cold air in at the time the metal is to be poured. The sudden admission of cold air into the superheated atmosphere causes a rapid condensation, and an obscuring cloud. This can be avoided by keeping the doors and windows closed during the short time, only thirty or forty minutes, for pouring the heated metal.

I have also summarized the result of all the eye injuries which have come under my own observation in the first six months of nineteen hundred and fifteen, and from these results I have endeavored to draw conclusions as to the measures which might be effectively taken to increase the efficiency of our protective measures, and to limit the number of these deplorable and costly accidents in the future.

Among the accidents which most commonly

occur are those which happen to adults in the performance of their usual avocations. In the series of my own cases of thirty, which occurred during the past year, six, or twenty per cent, were in children.

In this connection it is interesting to note that non-industrial injuries of the eye according to Henry Copley Greene, who has made an interesting study of 2,330 hospital cases of injury and diseases of the eye, found that fifteen and one-tenth per cent were those of non-industrial character. They were responsible for four of the 120 cases of practical blindness in the better eye resulting from single causes. After giving many important statistical facts, he continues: "From the foregoing data it appears that non-industrial injuries to the eye are of the first importance, both socially and economically. Out-ranking those industrial injuries of which we hear so much, they are the most frequent of eye difficulties treated in the three typical hospitals, whose records have been considered. Their cost, therefore, is heavy, not only to these institutions, but to the patients themselves. The loss in actual wages is especially great because a very large proportion, 83 per cent, of the patients are men and boys; and this loss is further emphasized by the fact that the patients are so often young persons whose handicap will continue throughout their working life."

It is not only the uneducated, or those of untrained mind who fail to picture to themselves the deplorable results of their own negligence or carelessness,—almost equally reprehensible in this regard are those of the highest intelligence and of the keenest minds. To all alike the possibility of individual injury is so remote that it is ignored until it is too late.

The mother, whose child's welfare is more dear to her than her own life, will allow her two year old baby to play with a buttonhook. The aimless hands catch the point in the little one's eye, and the lid and the eye muscles are dragged off in consequence, leaving a deformity which no skill can wholly repair. Another little toddler stumbles and falls with sharp scissors in her hand,—the pointed blade punctures the eye and sight is destroyed. A group of children are playing with pointed sticks. One pokes the other in the eye and ruptures the globe. Boys are playing the game called "One old cat" in which a piece of wood is pointed in the form of a double cone. This is struck on the end so it flies through the air. It strikes a playfellow's eye with the usual disastrous result. A young man, stooping to pick up something from the floor in the dark, strikes his eye on the back of a chair, and enucleation of the eye follows. A boy is sharpening his pencil toward himself. The knife slips, penetrating the eye. A woman tries to pick open a hard knot on a bundle with a sharp pointed scissor's blade. It slips, stabbing into the eye. A bird-shot from a boy's gun, carelessly aimed, pene-



A group of twenty-one children from the State School for the Blind at Batavia whose eyes were lost through accidents which could largely have been prevented. The second eye in most cases was lost through sympathetic ophthalmia.

trates the eye ball, and this is most disastrous because the lead can rarely be secured.

These are instances which might be indefinitely extended,—every one of which has occurred in the writer's experience, and each one of which was the result of unwarrantably gross carelessness, due to the fact that the possible dangers had not been individually pointed out. An eminent Italian jurist once said: "That in order to convey an idea it must be repeated five times. The first time it is not heard, the second time it receives no attention, the third time it is not understood, the fourth time it is not believed,—therefore it is necessary to repeat it the fifth time."

In the campaign which is being waged to prevent blindness we all need wider information. The edge of the subject has but just been touched, and its measureless value we have none of us begun to realize. Following the lines of necessary education, if we are to secure the minimum advantages desired, is to keep constantly and repeatedly before the attention of the individual to whom accidents may occur the way injuries are received and how they may be avoided.

Second, to secure by process of law where necessary, and always when possible with the co-operation of the employer in those trades which endanger the eyes, the use of such protective devices, and such proper conditions as will minimize the danger to the last degree.

And third, to have so thoroughly understood on the part of the medical profession the imperative necessity of prompt and correct first aid in every case of eye injury that we shall be freed from the criticism of contributing even in a small degree to the loss of sight in a single human eye. I will speak of each of these points in turn.

The education of the individual, in order that he may protect himself against injury, and not be a source of danger to others, is by no means as difficult a task as at first glance it would appear. Even when dealing with children, or with stupid adults, the essential pedagogic principle is repetition, until ultimately the automatic premonition of danger with its warning comes from the subconscious mind. It was a stroke of genius when some efficiency man on the New York Central R. R. evolved the slogan, "Safety First." It is impossible to have these words strike the eye at every turn without being impressed with the necessity of added caution. The most effective educational measures, moreover, are not didactic. We are all consciously or unconsciously imitators. The introduction of safety devices, like the automobile horn, is an evidence of approaching danger. The fact that they are there suggests the necessity of greater care. So if the requirement is exacted that goggles *must* be worn where there is danger from flying fragments or of molten

metal, under penalty of dismissal, in a short time it becomes as much a routine to protect the eyes as it is to slip on the gear by which the grinding wheel is started.

I am not by any means sure that it would not be a desirable procedure to penalize the proprietor when an employee is injured through his neglect to use the security provided, because by so doing the latter in turn would be obliged in self protection to insist on the rigid application of the rules of the shop. But on the other hand, in justice to the workman, the devices used upon the machinery or for his personal use, must be so constructed that they do not hamper his work.

An objection frequently and justly urged is that the shields, which are purchased ready made, fit the machines so badly that they prove to be an annoyance, and are consequently laid aside, or that the goggles which are provided are so poorly adjusted that they cause discomfort, and the workman would rather take a chance (which seems to him remote of losing an eye) to wearing them.

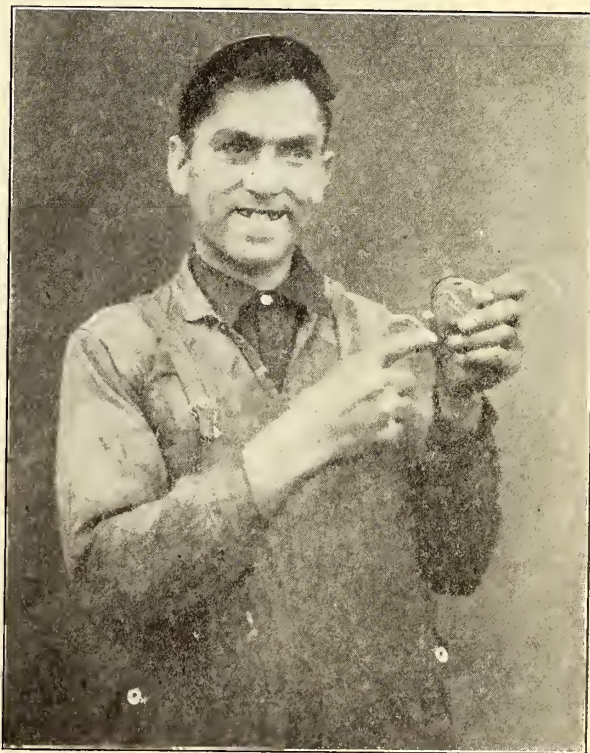
The first difficulty has been met in the New York Central shops by a shrewd recognition of a common human trait. The men have been allowed, indeed encouraged, each to make the protection necessary for his own machine. He has a personal pride then in its construction. He adapts it as a skilled mechanic should to its purpose. Its use gives an additional pleasure to his work.

It is an easy matter to have the goggles adjusted to the individual as one would for motor-ing, and the satisfaction of the personal consideration involved makes their employment at the wheel become a habit. The responsibility for the education of mothers as to the danger involved in allowing sharp implements or dangerous playthings in the hands of children who have not yet acquired muscular and mental control should rest in the Board of Health, or in the Board of Public Education, or both. It was proposed in a report on this subject made before the National Education Association some years ago, that one of the blank pages in every school book might be used, without additional cost, and with great advantage, in giving a few brief directions concerning the care of the eyes.

As the book is of an educational character, and the student is to make the adventure of using it with his eyes, he should be told how to do so without injuring them. The following was given as an outline of this page:

TAKE CARE OF YOUR EYES.

1. Always take good care of your eyes. Blindness is one of the most serious afflictions that can happen to you.
2. In reading or writing the light should come over the left shoulder and be strong enough to enable you to see clearly.
3. A good lamp on the table is much better than a flickering gas light hanging from the ceil-



Effective pictures used by the New York Central Railroad in their shops to impress on workmen the value of protective devices. The man on the left wore no goggles and lost an eye; the man on the right has broken goggles and has saved his eye.

ing. The light should be properly shaded so that the glare does not hurt your eyes. The pages should be kept clean so that the type may be easily read. If the margins of the eye lid are red or sore, if the lids discharge, if the use of the eyes causes them to pain or the head to ache, if the letters on the page blur or become indistinct, the eyes should be examined by a competent person and proper spectacles should be used if needed.

4. Roller towels should never be used; they may carry disease of the eyes from one person to another.

5. Do not play with sharp pointed sticks, nor cut with the blade of a penknife toward you. Do not try to untie knots with sharp pointed instruments or buttonhooks; many eyes have been seriously hurt in this way.

6. Injuries or inflammation of the eyes should receive care from a skilled doctor promptly. Blindness may thereby be prevented.

There is no reason why this should not be done. The publishers would, I am sure, willingly co-operate, but as it has not been done, leaflets issued in large number by the Health Boards, or the Department of Education might assume this simple and inexpensive work.

In the second place it is reasonable to insist that the employers free labor from every unnecessary difficulty and danger. In the large industries this has become an essential part of the efficiency methods. The United States Steel Corporation has in its Safety Department alone a staff of eighty high grade men who are employed in perfecting methods for securing greater personal safety for the workmen employed. While the New York Central has so increased its efficiency, largely through these means, to have effected during the past year a saving of over a thousand dollars a day.

Another cause of accidents which had not occurred to me, but which Dr. Decot of Buffalo has noted, is that some of the injured men had imperfect sight to begin with. At the age of forty-five or thereabout is the beginning of presbyopia, or old sight. With no lessening of sight at twenty feet or beyond,—objects are dim at the working age if the eyes are not aided by near range glasses at this time. In some instances, too, former injuries have left scars or other defects which lower the acuity of sight. For every workman the physical examination should include a test of the sight, and this should be a permanent record as a standard, so that later in case of injury should a claim for damages be instituted, the exact amount of loss may be determined and from this the indemnity estimated.

With the conditions to which I have referred having to do with the public health, with public education, and with the laborer and the employer of labor, we are concerned only as citizens who are interested in the social welfare.

Relative to the third condition to which I have referred we are directly concerned as medical

men. The imperative importance of securing correct first treatment of the injured eye, and this at the earliest possible moment, cannot be too forcefully emphasized. This has so impressed a large number of eye surgeons that almost every one of the group to whom the question was asked, "how could these accidents been avoided and better results as to sight obtained?" urged the necessity of correct and prompt first aid.

The urgency in the case of eye injuries lies in the fact that in the first place, if the eye is injured, and the iris prolapsed, the prolapsed portion should be immediately removed. It may be possible in that way to prevent a permanent inclusion of the iris in the wound, deposit of lymph in the pupillary area, and the intra-ocular inflammation which would consequently follow. This can be measurably anticipated by the use of atropine.

The second equally great danger is pneumococcal infection. This is very likely to follow wounds from chips of stone, from a beard of wheat going in the eye in the case of farmers, and puncture from a thorn, and even very slight injuries which leave an open surface on the cornea. The pneumococcus is as virulent in the eye as it is in the lungs. The tissue which is destroyed by ulceration, even if the eye is ultimately saved, is replaced by opaque scar tissue, leaving the vision so reduced as often practically to destroy the sight. We have, happily, for this an almost perfect specific in the ethylhydrocuprein hydrochloride, which is known by the trade name of optochin. It is a white salt, readily soluble in water, and was recommended by Leber at the Heidelberg Ophthalmological Congress in 1913. It has been so favorably reported on, and has proved so valuable in the hands of eye surgeons that all of those who are in the habit of seeing accidents with infections of this kind should have it readily available. It should be used every hour during the day, and occasionally, in acute cases, during the night, where the pneumococcus has been found to be the exciting cause of the ulcer. Of course, it is understood that it is primarily necessary that the foreign body, which is the exciting cause, be completely removed.

It would seem from these facts that the price which is paid in the loss of human eyes in the industries and elsewhere from negligence and gross carelessness is enormous.

It is evident, moreover, that by the united efforts of physicians, employers and others, this can be largely decreased. It would be quite within the province of the State Commission for the Blind to ask the aid of the medical profession in getting reports of all cases of accidents and injuries resulting in the destruction of sight. It ought to be possible from this to devise methods by which a large number might be protected and a great saving of money and higher efficiency secured.

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